INVENTIVE COMPOSITION 16

The materials, except the process oil, were blended together in a tumbler. The obtained blend was fed into a twin screw extruder through a feed hopper, while the process oil entered the extruder through a vent hole. The materials were kneaded and extruded at 200° C. and pelletized. Then, the obtained pellets were subjected to pulverization and powder molding viscosity and tensile properties were determined in a manner similar to that used for Compositions 13–15.

The results of these tests are given in Table 8.

COMPARATIVE COMPOSITIONS 17 AND 18

The materials were kneaded and pelletized in the same manner as that used for Compositions 13–16, except that no organic peroxide was used. The obtained pellets were subjected to pulverization and power molding. Melt viscosity and tensile properties were determined.

The results of these tests are given in Table 8, above.

It is apparent from the testing of Compositions 13–18 that the melt flow properties are superior in cases where an organic peroxide is used, with the other desirable tensile characteristics remaining unchanged.

The foregoing disclosure of specific embodiments is intended to be illustrative of the broad concepts comprehended by the invention.

We claim:

1. A thermoplastic elastomer composition for powder slush molding, said composition comprising:
   a polypropylene resin,
   a hydrogenated styrene/butadiene rubber,
   a process oil, and
   an elastomer excellent in oil absorbing power selected from the group consisting of styrene/ethylene/propylene/styrene block copolymers, styrene/ethylene/

butylene/styrene block copolymers, and crystalline olefin/ethylene/butylene/crystalline olefin block copolymers.

2. The thermoplastic elastomer composition according to claim 1 wherein the composition has a melt flow rate (MFR) of at least 5 g/10 min as determined according to JIS K-7210 at 250° C. under a load of 0.325 kgf.

3. The thermoplastic elastomer composition according to claim 1 wherein the weight ratio of the polypropylene resin to the hydrogenated styrene/butadiene rubber is between 80:20 and 20:80.

4. The thermoplastic elastomer composition according to claim 1 wherein the elastomer excellent in oil absorbing power is present in an amount of 20 to 250 parts by weight per 100 parts by weight of the hydrogenated styrene/butadiene rubber.

5. The thermoplastic elastomer composition according to claim 1 wherein the process oil is present in an amount of 5 to 200 parts by weight per 100 parts by weight of the elastomer excellent in oil absorbing power.

6. The thermoplastic elastomer composition according to claim 1 including one or more of a heat stabilizer, light stabilizer, pigment, lubricant, and filler.

7. The thermoplastic elastomer composition according to claim 6 wherein the heat stabilizer is a combination of a phenolic antioxidant with a phosphite antioxidant.

8. The thermoplastic elastomer composition according to claim 6 wherein the light stabilizer is one of a hindered amine and a benzotriazole.

9. The thermoplastic elastomer composition according to claim 6 wherein the pigment is one of an organic and inorganic pigment suitable for use with olefins.

10. The thermoplastic elastomer composition according to claim 6 wherein the lubricant is a metal salt of a fatty acid.

11. The thermoplastic elastomer composition according to claim 6 wherein the filler is one of calcium carbonate and talc.

12. A process for the preparation of a thermoplastic elastomer composition for powder molding, said process including the steps of:

adding at least a hydrogenated styrene/butadiene rubber, a process oil, and an elastomer excellent in oil absorbing power selected from the group consisting of styrene/ethylene/propylene/styrene block copolymers, styrene/ethylene/butylene/styrene block copolymers, and crystalline olefin/ethylene/butylene/crystalline olefin block copolymers to a polypropylene resin to produce a mixture; and

simultaneously kneading and heating the obtained mixture.

13. A process for the preparation of a thermoplastic elastomer composition for powder slush molding, said process including the steps of:

preparing a blend comprising a polypropylene resin and a hydrogenated styrene/butadiene rubber at a weight ratio in the range of 80:20 to 20:80;

adding an elastomer excellent in oil absorbing power selected from the group consisting of styrene/ethylene/propylene/styrene block copolymers, styrene/ethylene/butylene/styrene block copolymers, and crystalline olefin/ethylene/butylene/crystalline olefin block copolymers to the blend in an amount of 20 to 250 parts by weight per 100 parts by weight of the hydrogenated styrene butadiene rubber;

adding a process oil in an amount of 5 to 200 parts by weight per 100 parts by weight of the elastomer excellent in oil absorbing power to produce a mixture,

kneading and pelletizing the mixture while heating; and

pulverizing the obtained pellets with the obtained pellets one of a) at ambient temperature and b) in a frozen state.

14. A process for the preparation of a thermoplastic elastomer composition for powder molding, said process including the steps of:

adding at least a hydrogenated styrene/butadiene rubber, a process oil, an elastomer excellent in oil absorbing power selected from the group consisting of styrene/ethylene/propylene/styrene block copolymers, styrene/ethylene/butylene/styrene block copolymers, and crystalline olefin/ethylene/butylene/crystalline olefin block copolymers and an organic peroxide to a polypropylene resin to obtain a mixture; and

simultaneously kneading and heating the obtained mixture.

15. The process for the preparation of a thermoplastic elastomer composition according to claim 14 wherein the step of adding an organic peroxide comprises the step of adding an organic peroxide selected from among diacyl peroxides, peroxy esters, diallyl peroxide, di-t-butyl peroxide, t-butyl cumyl peroxide, dicumyl peroxide, 2,5-dimethyl-2,5-di(t-butylperoxy)hexane-3,1,3-bis(t-butylperoxyisopropyl)benzene, and 1,1-dibutylperoxy-3,3,5-trimethylcyclohexane.

16. The process for the preparation of a thermoplastic elastomer composition according to claim 14 wherein the step of adding an organic peroxide comprises the step of adding an organic peroxide in an amount of 0.02 to 5% by weight.

17. The process for the preparation of a thermoplastic elastomer composition for powder molding according to claim 14 wherein the adding step comprises the step of adding the organic peroxide in an amount of 0.02 to 5.0% by weight of the thermoplastic elastomer composition.

18. The process for the preparation of a thermoplastic elastomer composition according to claim 17 wherein the step of adding an organic peroxide comprises the step of adding an organic peroxide selected from among diacyl peroxides, peroxy esters, diallyl peroxide, di-t-butyl peroxide, t-butyl cumyl peroxide, dicumyl peroxide, 2,5-dimethyl-2,5-di(t-butylperoxy)hexane-3,1,3-bis(t-butylperoxyisopropyl)benzene, and 1,1-dibutylperoxy-3,3,5-trimethylcyclohexane.

19. The process for the preparation of a thermoplastic elastomer Composition according to claim 17 wherein the step of adding an organic peroxide comprises the step of adding an organic peroxide in an amount of 0.02 to 5% by weight.

20. The process for the preparation of a thermoplastic elastomer composition for powder molding according to claim 14 wherein the kneading step comprises kneading at a temperature of 120 to 250° C.

21. A process for the preparation of a thermoplastic elastomer composition for powder slush molding, said process including the steps of:

preparing a blend comprising a polypropylene resin and a hydrogenated styrene/butadiene rubber at a weight ratio in the range of 80:20 to 20:80;

adding an elastomer excellent in oil absorbing power selected from the group consisting of styrene/ethylene/propylene/styrene block copolymers, styrene/ethylene/

butylene/styrene block copolymers, and crystalline olefin/ethylene/butylene/crystalline olefin block copolymers to the blend in an amount of 20 to 250 parts by weight per 100 parts bey weight of the hydrogenated styrene/butadiene rubber;

adding a process oil to the blend in an amount of 5 to 200 parts by weight per 100 parts by weight of the elastomer excellent in oil absorbing power;

adding an organic peroxide to the blend in an amount of 0.02 to 5.0% by weight of the thermoplastic elastomer composition;

kneading and pelletizing the resulting blend while heating; and

pulverizing the obtained pellets with the obtained pellets one of a) at room temperature and b) in a frozen state.

22. The process for the preparation of a thermoplastic elastomer composition for powder molding according to claim 21 wherein the kneading step comprises kneading at a temperature of 120 to 250° C.

23. The process for the preparation of a thermoplastic elastomer composition for powder molding according to claim 16 including the step of adding one or more of a heat stabilizer, light stabilizer, pigment, lubricant, and filler.

24. The process for the preparation of a thermoplastic elastomer composition for powder molding according to claim 18 including the step of adding one or more of a heat stabilizer, light stabilizer, pigments, lubricant, and filler.

25. The process for the preparation of a thermoplastic elastomer composition for powder molding according to claim 18 including the step of adding one or more of a heat stabilizer, light stabilizer, pigment, lubricant, and filler.

26. The process for the preparation of a thermoplastic elastomer composition for powder molding according to claim 21 including the step of adding one or more of a heat stabilizer, light stabilizer, pigments, lubricant, and filler.

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27. A thermoplastic elastomer composition for powder slush molding, said composition comprising:

a polypropylene resin,

a hydrogenated styrene/butadiene rubber,

a process oil, and

an elastomer excellent in oil absorbing power selected from the group consisting of styrene/ethylene/propylene/styrene block copolymers, styrene/ethylene/butylene/styrene block copolymers, crystalline olefin/ethylene/butylene/crystalline olefin block copolymers, and ethylene/octene copolymers.

28. The thermoplastic elastomer composition according to claim 27 wherein the composition has a melt flow rate (MFR) of at least 5 g/10 min as determined according to JIS K-7210 at 250 degrees Centigrade under a load of 0.325 kgf.

29. The thermoplastic elastomer composition according to claim 27 wherein the weight ratio of the polypropylene resin to the hydrogenated styrene/butadiene rubber is between 80:20 and 20:80.

30. The thermoplastic elastomer composition according to claim 27 wherein the elastomer excellent in oil absorbing power is present in an amount of 20 to 250 parts by weight per 100 parts by weight of the hydrogenated styrene/butadiene rubber.

31. The thermoplastic elastomer composition according to claim 27 wherein the process oil is present in an amount of 5 to 200 parts by weight per 100 parts by weight of the elastomer excellent in oil absorbing power.

32. The thermoplastic elastomer composition according to claim 27 including one or more of a heat stabilizer, light stabilizer, pigment, lubricant, and filler.

33. The thermoplastic elastomer composition according to claim 32 wherein the heat stabilizer is a combination of a phenolic antioxidant with a phosphite antioxidant.

34. The thermoplastic elastomer composition according to claim 32 wherein the light stabilizer is one of a hindered amine and a bensotriazole.

35. The thermoplastic elastomer composition according to claim 32 wherein the pigment is one of an organic and inorganic pigment suitable for use with olefins.

36. The thermoplastic elastomer composition according to claim 32 wherein the lubricant is a metal salt of a fatty acid.

37. The thermoplastic elastomer composition according to claim 32 wherein the filler is one of calcium carbonate and talc.

38. A process for the preparation of a thermoplastic elastomer composition for powder molding, said process including the steps of:

adding at least a hydrogenated styrene/butadiene rubber, a process oil, and an elastomer excellent in oil absorbing power selected from the group consisting of styrene/ethylene/propylene/styrene block copolymers, styrene/ethylene/butylene/styrene block copolymers, crystalline olefin/ethylene/butylene/crystalline olefin block

copolymers, and ethylene/octene copolymers to a polypropylene resin to produce a mixture; and

simultaneously kneading and heating the obtained mixture.

39. A process for the preparation of a thermoplastic elastomer composition for powder slush molding, said process including the steps of:

preparing a blend comprising a polypropylene resin and a hydrogenated styrene/butadiene rubber at a weight ratio in the range of 80:20 to 20:80;

adding an elastomer excellent in oil absorbing power selected from the group consisting of styrene/ethylene/propylene/styrene block copolymers, styrene/ethylene/butylene/styrene block copolymers, crystalline olefin/ethylene/butylene/crystalline olefin block copolymers, and ethylene/octene copolymers to the blend in an amount of 20 to 250 parts by weight per 100 parts by weight of the hydrogenated styrene butadiene rubber;

adding a process oil in an amount of 5 to 200 parts by weight per 100 parts by weight of the elastomer excellent in oil absorbing power to produce a mixture,

kneading and pelletizing the mixture while heating; and

pulverizing the obtained pellets with the obtained pellets one of a) at ambient temperature and b) in a frozen state.

40. A process for the preparation of a thermoplastic elastomer composition for powder molding, said process including the steps of:

adding at least a hydrogenated styrene/butadiene rubber, a process oil, an elastomer excellent in oil absorbing power selected from the group consisting of styrene/ethylene/propylene/styrene block copolymers, styrene/ethylene/butylene/styrene

block copolymers, crystalline olefin/ethylene/butylene/crystalline olefin block copolymers, and ethylene/octene copolymers and an organic peroxide to a polypropylene resin to obtain a mixture; and

simultaneously kneading and heating the obtained mixture.

41. The process for the preparation of a thermoplastic elastomer composition for powder molding according to claim 40 wherein the kneading step comprises kneading at a temperature of 120 to 250 degrees Centigrade.

42. The process for the preparation of a thermoplastic elastomer composition according to claim 40 wherein the step of adding an organic peroxide comprises the step of adding an organic peroxide selected from among diacyl peroxides, peroxy esters, diallyl peroxide, di-t-butyl peroxide, t-butyl cumyl peroxide, dicumyl peroxide, 2,5-dimethyl-2,5-di(t-butylperoxy)hexane-3,1,3-bis(t-butylperoxyisopropyl) benzene, and 1,1-dibutylperoxy-3,3,5-trimethylcyclohexane.

43. The process for the preparation of a thermoplastic elastomer composition for powder molding according to claim 40 wherein the adding step comprises the step of adding the organic peroxide in an amount of 0.02 to 5.0% by weight of the thermoplastic elastomer composition.

44. The process for the preparation of a thermoplastic elastomer composition for powder molding according to claim 43 including the step of adding one or more of a heat stabilizer, light stabilizer, pigment, lubricant, and filler.

45. The process for the preparation of a thermoplastic elastomer composition according to claim 43 wherein the step of adding an organic peroxide comprises the step of adding an organic peroxide selected from among diacyl peroxides, peroxy esters, diallyl peroxide, di-t-butyl peroxide, t-butyl cumyl peroxide, dicumyl peroxide, 2,5-

dimethyl-2,5-di(t-butylperoxy)hexane-3,1,3-bis(t-butylperoxyisopropyl) benzene, and 1,1-dibutylperoxy-3,3,5-trimethylcyclohexane.

46. The process for the preparation of a thermoplastic elastomer composition for powder molding according to claim 45 including the step of adding one or more of a heat stabilizer, light stabilizer, pigments, lubricant, and filler.

47. A process for the preparation of a thermoplastic elastomer composition for powder slush molding, said process including the steps of:

preparing a blend comprising a polypropylene resin and a hydrogenated styrene/butadiene rubber at a weight ratio in the range of 80:20 to 20:80;

adding an elastomer excellent in oil absorbing power selected from the group consisting of styrene/ethylene/propylene/styrene block copolymers, styrene/ethylene/butylene/styrene block copolymers, crystalline olefin/ethylene/butylene/crystalline olefin block copolymers, and ethylene/octene copolymers to the blend in an amount of 20 to 250 parts by weight per 100 parts by weight of the hydrogenated styrene/butadiene rubber;

adding a process oil to the blend in an amount of 5 to 200 parts by weight per 100 parts by weight of the elastomer excellent in oil absorbing power;

adding an organic peroxide to the blend in an amount of 0.02 to 5.0% by weight of the thermoplastic elastomer composition;

kneading and pelletizing the resulting blend while heating; and

pulverizing the obtained pellets with the obtained pellets one of a) at room temperature and b) in a frozen state.

48. The process for the preparation of a thermoplastic elastomer composition for powder molding according to claim 47 wherein the kneading step comprises kneading at a temperature of 120 to 250 degrees Centigrade.

49. The process for the preparation of a thermoplastic elastomer composition for powder molding according to claim 48 including the step of adding one or more of a heat stabilizer, light stabilizer, pigments, lubricant, and filler.